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(54) **Security device**

(57) A security device for forming a ring or shackle seal. The device includes a housing (14) at one end of a band (10) into which a male element (12) at the other end of the band is insertable. The housing has opposing laterally offset teeth (28) integrally formed therein for interlocking with complementary recesses (54, 56) in opposite faces of the male element to prevent withdrawal of the male element from the housing. The housing includes only the one entrance (16) for receiving the male element which element may include blocking means (60, 62) for occupying the opening into the housing. The device confers improved security in that the teeth are inaccessible for pre-tampering prior to the seal being formed and once formed, access into the housing is inhibited by the blocking means.

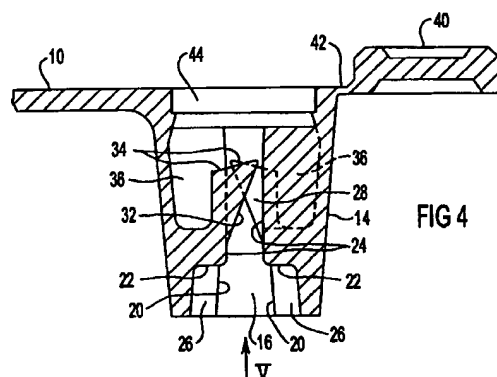


FIG 4

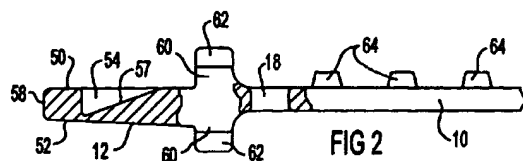


FIG 2

DescriptionTechnical Field

[0001] The present invention relates to a security device, such as a security seal or tie. The invention has particular application for use as a ring seal or shackle seal and is described herein in this context. However, it is to be understood that the invention has broader application and is not limited to this particular use.

Background

[0002] The ring seal or shackle seal is a known security device and in its simplest form comprises a flexible band or strip which includes non-releasable interengaging elements on its opposite ends. Once the elements are engaged, the band or strip forms a complete ring or shackle which can only be broken by breaking the band or strip or destroying one or both of the engaging elements.

[0003] Such devices thereby provide observable evidence of improper access to or tampering with whatever is intended to be protected by the device. Such devices are typically arranged so that they cannot be breached without destruction or partial destruction of the device, and it is this characteristic which provides visible evidence of the breach.

[0004] Devices of the foregoing kind are used in a broad range of applications. In one application the device is used to protect cash bags or document pouches against unauthorised access or tampering. In another application, the device is used in the transport industry where a load to be transported is checked before departure and a ring seal is applied to the shutter or hitches of the vehicle to protect or verify the integrity of the load. If the seal remains intact throughout the journey, then this verifies that the load has not been accessed. As can be seen from these applications, the effectiveness of the seal requires that the interengaging elements be incapable of release and subsequent re-engagement without damaging or destroying the device.

[0005] A known prior art seal comprises a flexible band having a housing at one end and a male element at the other end. The housing has a passage therethrough and an insert is provided for insertion into the passage through one end to thereby close that end. This insert includes a tooth or teeth with which complementary parts on the male element are engageable when that element is inserted into the other end of the passage in the housing to prevent retraction of the male member from the housing. Problems with this seal are that the insert must be securely attached to the housing, otherwise the seal can be breached without leaving evidence of the breach. Also, the teeth on the insert are readily accessible prior to the seal being formed and thereby allow the possibility of pre-tampering with the

device.

Summary Of The Invention

[0006] The present invention provides a security device which includes a housing into which a male element is insertable and which has male locking means formed integrally within the housing for interlocking with complementary female locking means on the male element. The housing includes only the one entrance for receiving the male element and preferably the male element includes blocking means which, cooperatively with this entrance, inhibit access to the interengaging male-female locking means within the housing to thereby improve the security of the device.

[0007] Preferably the male element and the housing are connected by a flexible strap and the male locking means of the housing include two opposing similar formations. These formations may be laterally offset from each other on either side of a central axis of the housing. Such formations can engage with at least two complementary oppositely facing female locking means formed in the male element. Preferably the male locking formations within the housing comprise a pair of opposing laterally offset teeth and the complementary female means comprise oppositely facing recesses, which, for a rectangular or like cross-sectional male element, are formed in opposite faces of the male element and into which the teeth seat. The arrangement of such teeth and recesses may provide for a "snap" engagement of the male element within the housing.

[0008] An advantage provided by the invention is that the male locking means within the housing are difficult to access and this reduces the possibility of pretampering with them (i.e. tampering with them prior to the seal being formed such that after the male element is inserted in the housing, it is possible to undo the seal without visible evidence thereof). This advantage is improved for locking means in the form of at least two similar, opposing and laterally offset means.

[0009] The band or strip connecting the housing and the male element may include a weakened section which in the event of any unauthorised attempt to open the seal, will break relatively easily thereby affording evidence that the seal has been breached.

[0010] Preferably the security device is moulded in one piece from a resilient plastics material.

[0011] An embodiment of the invention will now be described, by way of nonlimiting example only, with reference to the drawings. The generality of the above broad description of the invention is not to be limited by any specifics of the following description of one embodiment.

Brief Description of Drawings

[0012]

Fig. 1 is a plan view of the male element end of an embodiment of the invention.

Fig. 2 is a part section through the centre line of the Fig. 1 security device.

Fig. 3 is a plan view of the housing end of the Fig. 1 device, prior to a final manufacturing step.

Fig. 4 is a section along section line IV-IV of Fig. 3.

Fig. 5 is a view from the direction of arrow V of Fig. 4.

Best Mode For Carrying Out The Invention

[0013] A security device according to the illustrated embodiment of the invention comprises a flexible strap 10 having a male element 12 formed at one end and a housing 14 formed at the opposite end. Instead of a strap or band, the housing 14 and male element 12 may be connected by a strip which may have a generally circular cross section. By bending strap 10, the male element 12 can be inserted into an opening of a passage 16 into housing 14 to be non-releasably engaged therein thereby forming the device into an unbroken ring. The strap 10 preferably includes a cut out leaving frangible bridging connections 18. Alternatively a reduced cross-section and thereby frangible portion could be provided across the width of the strap 10. The connections 18 provide a hinge for the male element 12 and also a relatively readily breakable section for affording evidence of any unauthorised tampering with the security device.

[0014] The passage 16 is generally rectangular in section and includes facing walls 20 at its entrance from each of which, within the housing, an abutment surface 22 extends a short distance towards the other to join facing walls 24. The walls 20, 22 and 24 provide a shoulder formation along two facing opposite sides of the passage 16. The walls 20 include opposite grooves 26 which extend to the abutment surfaces 22.

[0015] Each wall 24 includes male locking means in the form of a tooth 28 which extends into the passage 16. It is to be understood that the male locking means could be other than teeth. As best seen in Fig. 5, the teeth 28 are located wholly within housing 14 and are laterally offset relative to a transverse axis 30 of the housing 14. Each tooth 28 includes a surface 32 which slopes from wall 24 inwardly of passage 16 and an "upper" or end surface 34 which extends from surface 32 to a recess 36 formed behind the tooth 28 (note the term "upper" has been used in accordance with the orientation of the security device as shown in Fig. 4, it and similar qualifying terms are not to be taken as limiting on the invention). A cut-out 38 extends from recess 36 along each side of each tooth to wall 20 thereby allowing each tooth 28 to resiliently flex outwardly relative to

passage 16 about its base region between wall 24 and the base of recess 36.

[0016] Figs. 3 and 4 illustrate the device prior to a final manufacturing step as it is ejected from a mould wherein it includes a closure element 40 for the housing 14 which is connected thereto by a bridge piece or hinge 42. The as-moulded housing 14 includes a recess 44 for reception of the closure element 40. The final manufacturing step involves pivoting closure element 40 about hinge 42 to seat in recess 44 and permanently attaching the closure element 40 to the housing 14 by, for example, heat welding around its periphery. This allows the device to be manufactured using only the one moulding die and does not require a secondary assembly operation as are required for the above described prior art. That is, in a process of manufacture for the present invention, a step of locating and inserting a separately formed insert is eliminated. Production time is therefore reduced compared to that prior art. It will be appreciated that in its final form, the housing 14 of the security device includes only the one entrance for reception of male element 12 and that the teeth 28 are contained wholly within the housing and are thereby very difficult to access in any attempt at pre-tampering with them.

[0017] Male element 12 includes a leading end portion having opposite faces 50, 52 whereby the width of this leading end portion, that is the spacing between faces 50, 52 closely matches that between walls 24 in housing 14. This end portion may taper slightly in thickness away from end face 58. Within each surface 50, 52 is formed a recess 54, 56 respectively. Each recess 54, 56 includes a base surface 57 which slopes inwardly of the male element from a face 50, 52 towards the leading end 58 to meet an end surface 59 (see Fig. 2) to provide an abutment against which the end surface 34 of a tooth 28 bears to prevent retraction of the male element 12 from the passage 16. Each recess is laterally offset relative to the centre line of the male element (see Fig. 1) and the recesses 54, 56 are shaped and located such that the teeth 28 will seat therein when the male element 12 is inserted into the passage 16 in housing 14. Thus the recesses 54, 56 provide complementary female locking means in the male element 12 for interlocking with the male locking means formed integrally within the housing 14, namely the teeth 28.

[0018] The male element 12 also includes opposite ribs 60 which upstand from each surface 50, 52 and extend across the width of the strap 10. The ribs 60 are dimensioned to fit closely within housing 14 between walls 20. Each rib includes an upstanding lug 62 thereon which fits within the opposite grooves 26.

[0019] From the above description it will be appreciated that the male element 12 fits closely within the passage 16 in housing 14 and that the locking means (the teeth 28 and recesses 54, 56) prevent withdrawal of the male element. Furthermore, the shoulders provided by ribs 60 on male element 12 and the surfaces 20, 22 and

24 of passage 16 in housing 14 provide blocking means which present tortuous paths which together with the close fit of the male element in the housing, inhibits insertion of levering devices or implements between the male element and the walls of passage 16 in any unauthorised attempt to pry the device apart. Thus the male element is non-releasably engageable in the housing such that it cannot be released without partial destruction or damage to either or both the housing and the male element, which destruction or damage would be of a visible nature.

[0020] The security device is preferably injection moulded in one piece from a resilient plastics material such as polypropylene. The six raised formations 64 on the strap 10 near its end provide a finger grip to facilitate easier closing of the seal, particularly if an operator has wet or greasy fingers which may slip on the strap.

[0021] A security device as above described offers several advantages. For example, the location of the teeth within the housing makes them difficult to access prior to forming the seal and this difficulty is compounded by them being oppositely directed and laterally offset. Thus pre-tampering with the device is substantially inhibited. Furthermore, once the device is closed, the engagement of lugs 62 on male element 12 in grooves 26 in housing 14 prevent any rotational movement of male element 12 within the passage 16 which, if permitted, could allow the device to be opened illegally without leaving any visible evidence thereof. The device is also easy to close in that the sloped facing surfaces 32 of teeth 28 provide ramp surfaces over which the end 58 of male element slides to resiliently cam the teeth apart for entry of the male element 12 into the passage 16. This ease of closure or latching of the device is an important benefit in situations where many of the devices have to be applied in a short period of time.

[0022] The invention described herein is susceptible to variations, modifications and/or additions other than those specifically described and it is to be understood that the invention includes all such variations, modifications and/or additions which fall within the scope of the following claims.

Claims

1. A security device comprising a strip having a housing at one end and a male element at its other end, wherein the housing has a single opening into which the male element is insertable to form the strip into a loop, wherein the housing includes integrally formed male locking means therein and the male element includes complementary female locking means for interlocking with the male locking means for preventing withdrawal of the male element from the housing.
2. A security device as claimed in claim 1 wherein the male element includes blocking means for occupy-

ing the opening into the housing for inhibiting access to the male and female locking means when interlocked within the housing.

3. A security device as claimed in claim 1 or 2 wherein the male locking means of the housing comprise two similar and opposing formations and the female locking means of the male element comprise oppositely facing recesses in the male element into which the formations seat.
4. A security device as claimed in claim 3 wherein the opposing formations are laterally offset from each other relative to a central axis of the housing.
5. A security device as claimed in claim 3 or 4 wherein the formations are teeth which are resiliently moveable relative to the housing.
6. A security device as claimed in claim 5 wherein each of the teeth comprise a surface which slopes inwardly of the housing in a direction away from the opening and an end surface which faces away from the opening, wherein the male element bears on the sloping surfaces to cam the teeth apart on its insertion into the housing, the teeth subsequently resiliently engaging in said recesses of the male element, wherein each recess includes a surface which abuts said end surfaces of the teeth to prevent withdrawal of the male element from the housing.
7. A security device as claimed in claim 6 as dependent on claim 4 wherein the offset teeth protrude into the housing such that a portion of each tooth overlaps the other.
8. A security device as claimed in claim 2 or any of claims 3 to 7 as dependent on claim 2, wherein the blocking means of the male element and the opening of the housing are relatively shaped to prevent the male element being twisted relative to the housing.
9. A security device as claimed in claim 2 or any of claims 3 to 8 as dependent on claim 2, wherein the blocking means of the male element and the opening of the housing are relatively shaped to provide a tortuous pathway for limiting access into the housing by insertion of a levering implement between the male element and the housing.
10. A security device as claimed in any preceding claim wherein the strip is a resiliently flexible band and includes a frangible portion.
11. A security device as claimed in claim 10 wherein the frangible portion provides a hinge which con-

nects the male element to the band.

12. A security device as claimed in any one of the preceding claims wherein the device is manufactured in one piece by moulding a plastics material, 5 wherein a hinged closure element of the one piece moulding is permanently fixed to the housing to close one end of a through passageway whereby the other end of the passageway provides said single opening into the housing. 10

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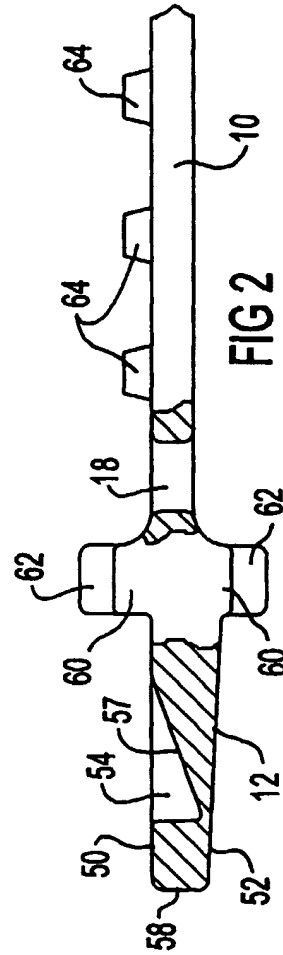
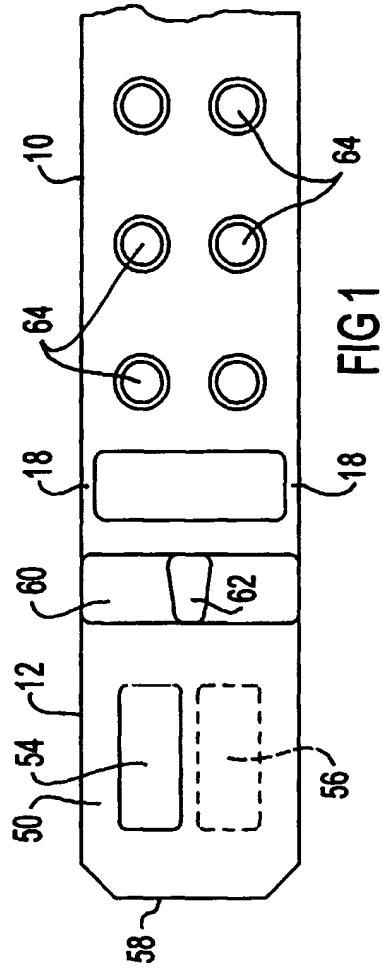
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